A ✓ Rec'd 28.2.19

File No. 413 . 1928

Collection No.

Comm 257/17 Mysore Residency.

Pros. Serial Nos. 26 — 46

Subject.

Improvements to Bangalore Water Supply.

Previous References.

Later References.

# N O T E.

(46)

1. The Municipal Commission are aware of the history of the Bangalore Water Supply up to the [redacted] date on which the present scheme for improving the Hesserghatta Reservoir was finally agreed to by all parties namely the Mysore Government, the Military Authorities and the Municipal Commission. ~~There is therefore no necessity to make any reference to events prior to that date.~~ For certain technical reasons the completion of the Scheme was delayed until 1926.

2. In May 1926, the Mysore Government realised that the Scheme for the improvement of the Hesserghatta reservoir would not suffice for the growing needs of the City and appointed a Committee under the Chairmanship of Sir M. Visvesvaraya to investigate the whole question of providing Bangalore with a more satisfactory source of water supply.

3. The Committee presented their report on the 1st July 1927.

From the report it will be seen that the Committee recommended the construction of a reservoir at T. (hereafter called "T" Scheme).

File Para 35
778-1926

4. A meeting was held on the 20th September, 1927, to discuss this scheme, at which representatives of the Mysore Government and the Military Authorities were present and Col. Robertson on behalf of the Government of India in the Army Department stated that there would be objection to the Mysore Government being given an opportunity of proving the value of the "T" Scheme subject to the following provisions :-

(a) That the works at Hesserghatta be held in abeyance until February 1928.

(b) That the new Mysore Government Scheme should be proceeded with at once.

(c) That the progress made on the new scheme should be examined in February 1928, and

and that if progress on the new Scheme then was found to be such as to show a reasonable probability of the scheme being completed within two years from its inception, further expenditure on the Hesserghatta scheme should be stopped.

(d) If, on the other hand, progress on the new scheme by February 1928 had not come up to expectations, and it was found that the new scheme could not be completed within two years, then the works at Hesserghatta should be proceeded with (if necessary side by side with the new scheme) and completed by the end of August 1928.

5. At a subsequent discussion on the 10th December, 1927, between the representatives of the Mysore Government and the Military Authorities, it was agreed that no further advance could be made until the question of cost and quantity of water to be supplied under the new Mysore Scheme was decided.

6. The Mysore Government were addressed on this point and submitted the following proposals :-

(a) " The quantity of water to be supplied to the Civil and Military Station will be subject to a minimum daily supply of 2½ million gallons, and a maximum daily supply of 3½ million gallons.

(b) The rate to be charged to the Civil and Military Station for unfiltered water for the new reservoir will be 6.8 annas per 1000 gallons.

This rate covers the actual cost, taking into account interest on capital depreciation and working expenses, with a small margin for possible increase of capital estimates, and other undertain factors.

The rate now given is not liable to any variation with reference to capital cost, and may be fixed in the first instance for a period of 10 years from the date water is supplied from the new reservoir. If necessary, the rate may be revised once in 10 years thereafter, by mutual agreement."

7. The Government of India in the Army Department, to whom these proposals were submitted, have replied that they agree to the provision of a daily minimum supply of 2½ million gallons, and a daily maximum supply of 3½ million gallons.

They also agree to the proposed cost of unfiltered water to be supplied, namely 6.8 annas per 1000 gallons and are prepared to bear 1/3rd of the cost.

They have expressed no opinion on the question of revision after a ten year period.

8. The views of the Commission are now invited on these proposals.

It must be made clear that in accepting the proposals now put forward in regard to cost of water and the maximum and minimum supply, the Municipal Commission are not committed in any way to participate in the "T" Scheme until that scheme has been proved to the entire satisfaction of the technical experts of the Government of India to be an unqualified success.

At the same time it must be noted that mutual agreement on these proposals must precede the commencement of work on the "T" Scheme, and that unless the C & M Station agree to bear a share of the cost it will not be possible for the Mysore Government to proceed with the Scheme at all.

1st 2 3 5.

O

(47) Please incorporate the alteration suggested by Mr Russell on page 5 of the proceedings in the final recast along with the verbal changes suggested by the Chief Secretary.

(48) When sending Mr Russell a copy of the proceedings in their final form, a covering d.o. can also be addressed to him in the sense of the Resident's remarks, as noted in the P.A.'s × letter. × P. Corr.

OOO
21/5

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Issued Confl. letter No. C/6016/778, dated the 25th May 1928. to Rs T.B. Russ, President, Municipal Commissioner of B. Slr. Bangalore.

Kl
25.5.28

Sl. 32

P. ur. I Memo No. 180 (13) - A/25, dated the 18th May 28, from the Govt of India, Hom. and For. Depte

P. ur. II D.O. letter, dated the 19th May 28, from Major C. Cobb, D. A. Q. M. G., Madras Dist.

P. ur. I.

Please see para 4 of the × Note at flag W in which the progress of the new Scheme (Thippogondanahalli Scheme) has been reported to.

× omit Para 136 Comp. file 778 of 26

P. T. O

The Garrison Engineer, Bangalore, may be addressed in the matter.

Draft submitted.

49
26
~~Para 137~~
Comp #778-28

O. no. II.

Please see the letter at flag P.

May be filed.

(50) C.H.S. 29/5/28. Issue & submit to Secy

29/5

Sl. 33 Issued No. 5157, dt. 29.5.28.

(51) Issued and submitted for information.

C.H.S. 29/5/28.

(52) Have my orders at paras 1 & 2 of these notes been carried out? I see no signs of it.

30/5

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G.O.C. Sl. 34 W.O. Letter, dated the -- May 28, from M. T.B. Russell, President, M.C., C.M.S., Bangalore.

(53) With reference to the foregoing para of office note, please see the letter at para 140. flag Q.

It is regretted that the file was sent without obtaining that letter from the Confidential Clerk.

The O.U.C. is submitted for information.

Secy

C.H.S. 31/5/28 30/31/5/28.

There were two typographical omissions in the draft proceedings which I corrected in the office copy, vide the first page of the annexure to para 134. I see that these were not carried out in the final draft, and that the Diwan alone is styled "Esq.", all the other gentlemen being called "Mr". The practice should have been uniform.

(54)

(55) The Resident may kindly see the p. n. c. for information

31/5

Result
1.v.1.

(56) The delay may be inevitable but it is time the Ins respectable. I want to address the G.I. before the end of the month.

1/6

Mr. Please speak.
1/6/28

P. no. 1 - 31.35

Letter No. 5223, dated the 30th/31st May 28; from the Garrison Engineer, Bangalore.

(57) The Govt of India have asked to be informed of the progress made in the preparation of the new scheme.

vide para 141 ante

Draft submitted.

C.A.S.
5/6/28

Secretary.

3/6/28 This ad interim reply may kindly be seen by the Resident in view of his note at para 16 ante, so that there may be no embarrassment in correspondence

(58) Result

9/6

S.N.36

Issued No. JS-47, dt 11. 6. 28

59 The Resident, M. C., may be reminded.

Draft submitted.

C.K.Srikantia Iyer.
13/6/28

14/6

Secretary

S.N.H

Issued N. 5690, dt 14. 6. 28.

60 No reply has been received from the Resident, M.C. to the reminder issued on the 14th June 1928. He may be reminded again. Draft submitted.

C.K.Srikantia Iyer
6/7/28

From para (60).

6/7/28

Secretary

S.N.37

N.O. Letter, dated the 9th July 1928, from Mr Russell, Resident, M. C., com. Affairs, Bellary.

61 Mr. Russell suggests that another Conference may be held in about ten days' time.

Submitted for orders.

C.K.Srikantia Iyer
9/7/28

From para (61).

9/7

Secretary.

62

File pro tem. as Mr Crumbie has seen

9/7

K C

SN. 38 D.O. letter, dated the 17th July 1928, from Col. Berry, C. R. E., Madras Dist.

(63) A copy of the proceedings of the Inspection Conference held at the Residency on the 14th July 1928, is not in the office.
Submitted for information.

C. Krishnamachariar
23/7/28

From para (63).

23/7

Secretary

(64) Nor was D. P.A.R. many. he asked if any note was taken

23/7

Asst. Secretary
24/7/28

(65) No. minutes were taken at this meeting I have seen. Russell & Col. Berjay

26/7.

26/7

SN. 39 D.O. letter, dated the 6th August 28, from Col. Berjay, C. R. E., Madras. Dist.

file D 2

(66) In view of the urgency of this question, the file may perhaps be sent U/O to Mr. Russell with the request that he will again assemble the Standing Committee of the Municipal Commrs. — which Mr. Bhore

vide SN. 30 & 36

might be requested to attend — and endeavour to get Mr. Bhore to furnish definite rates and to induce all concerned to come to some definite agreement, as, otherwise, having regard to "the many alternative schemes" referred to by Col. Bingay in para 9 of his letter (P. ins.), the matter is likely to be delayed indefinitely.

× S.N. 39.

For orders please.

Chokikanta Dyer
6/8/28

... From para (66).

Secretary

(67) For information. The next step does not seem to lie with Mr Russell, but with the Mysore Govt. vide para 8 of the p.u.c. and it is to their own interest to expedite the matter.

8/8 (From para 66)

Rajit (68)

Yes: but we should explain the relevant question as per a provisional. Will you write to Dewan or Finance Minister I cannot possibly put this question up to Secretary of the Financial Affairs on the Cost Sheet? I do not much mind, what letter will be but I must know what it will be before I put it up. Rajit

H.C. 10/8/28

(69) Vide para 68 of notes ante.
Draft submitted.

Chokkikanta Iyer
8/8/28.

From para (68).

Secretary

Retd

(70) I am sure the word "filtered" by us
taken in the draft from the note attached to Col.
B's letter, this is correct. JMC
9/8

SN.40. Issued D.O. No. 7557, d 10.8.28.

SN.41. Letter No. Col. 204, dated the 16th/18th August 1928, from the Mysore Govt.

(71) A copy of G. Lie. and of its enclosures may be sent to Col. Bingay with reference to para 8 of S.N. 39. Mr. Russell may be asked whether the rates proposed by the Mysore Govt are accepted by the Mund. Comm.
Two drafts submitted.

From para (71).

Chokkikanta Iyer
20/8/28

Secretary.

20/8

SN.42&43. Issued D.O. Nos 7941 & 7942, d 21.8.28.

Sr.44. D.O. letter No. 597/28, dated the 24th August 28,
P.U.C. I
from M. Russel, Resident, M. C., Cent. Prs., Bangal

" II Sr.45. D.O. letter, dated the 28th August 28, from
Lieut. Col. Bingay, C. R. S., Madras district.

(72) P.u.c.'s I and II.

The draft forwarded by Col. Bingay with P.U.C. II has been modified as shown in pencil. It has been reproduced in the usual draft form. Draft submitted from para (72).

C.K.Srikanta Ayer.
30/8/28

30/8/28

Secretary

(73) Please fair the draft as altered in duplicate and put up with the file to me for submission to the Resident

31/8

(74) Submitted accordingly.

C.K.Srikanta Ayer. From para (73).
31/8/28

31/8

Secretary

(75) Kindly see P.u.c.'s I & II. May the draft issue to the Mysore Govt. as suggested by Col. Bingay?

4/9

Result

Sr.46. Issued No. 8340, dt 4.9.28

26

D O

Awdry House,
Fernhill,
14th May 1928.

Dear —

I forward herewith a copy of the Proceedings of the Conference on the Bangalore Water Supply held at Awdry House on the 14th May, 1928.

I should be much obliged if you would kindly make any corrections or remarks you may consider necessary and return it to me.

Yours sincerely.

O/c

For Secretary to the Resident.

Madhava Rau, Esq.,
Chief Secretary to the Govt. of Mysore

B. Russell, Esq., I.C.S.,
President, Municipal Commission,
C & M Stn., Bangalore.

Major C. Cobb,
D.A.Q.M.G., Madras District.

27

D.O.
Camp:
No. 25/Encl.1.

GENERAL AND REVENUE SECRETARIAT,
(Camp) Fern Hill, - Nilgiris.
~~Bangalore~~,
Dated, 16th May 1928.

Mr. N. Madhava Rao,
Chief Secretary.

RESIDENT'S OFFICE
BANGALORE.
Register No. 4423
Date of Receipt 18/5/28
File No.

Dear Capt. Montgomery,

I return herewith the copy of the proceedings of the Conference on the 14th May 1928, forwarded with your D. O. letter No.68 T, dated 15th instant.

Mr. Bhore and myself have looked over the draft and find ~~that~~ it is in order but for a few verbal corrections which are indicated.

Yours sincerely,

T o

Capt. E. J. Montgomery,
Personal Assistant to the
Hon'ble the Resident in Mysore,
(Camp) Fern Hill, Nilgiris.

Passed to Secretary
17/5

Proceedings of informal Conference regarding the Bangalore Water Supply held in Awdry House, Ootacamund on the 14th May, 1928, at 10 A.M.

The following were present at the Conference

1. The Hon'ble Mr. L. M. Crump, C.I.E., Resident in Mysore.
2. Major General A. L. Tarver, C.B., C.I.E., D.S.O., G. O. C., Madras District.
3. Mirza Muhammad Ismail, C.B.E., C.I.E. Dewan of Mysore
4. Mr. J. Bhore, Chief Engineer, Mysore.
5. Mr. N. Madhava Rau, Chief Secretary to the Govt. of Mysore.
6. Mr. Venkattasubba Rao, Executive Engineer, Water Supply, Mysore.
7. Major C. Cobb, C.B.E., D.A.Q.M.G., Madras District.
8. Mr. A. C. Lothian, Secretary designate to the Resident in Mysore.
9. Mr. T. B. Russell, Collector, Civil & Military Station and President of the Municipal Commission.
10. Major K. A. G. Evans-Gordon, Secretary to the Resident.

Before the commencement of the meeting the note, of which a copy is attached below, was circulated by Mr. Bhore explaining that even if the weirs of Hesserghatta tank were raised as originally proposed, that tank could not be relied upon to produce the required supply of 3½ million gallons a day unless the Y. tank was retained as a permanent reserve, and the effect of

this would be to increase the capital cost of the Hesserghatta scheme by 14 lakhs which would work out at 2.25 annas per 1,000 gallons extra.

Mr. Crump opened the proceedings by inviting Mr. Russell to express his views on the new proposals, as the Municipal Commission were the only dissenters to the new scheme put forward by the Mysore Durbar for a reservoir at Thippagondanahalli

Mr. Russell said he had just received the note from the Chief Engineer, Mysore which put rather a new complexion on the Hesserghatta scheme, and if the facts therein stated on investigation proved accurate, some of the main objections of the Municipal Commission to the abandonment of the Hesserghatta scheme in favour of the T scheme would be removed; but he had had no opportunity of analysing the figures or of consulting his Committee, and until he had done so, he was not in a position to say anything definite.

Mr. Bhore pointed out that the most important fact was that the Hesserghatta ~~tank~~tank even with the proposed raised weirs would not be able to meet their requirements unless Y tank were incorporated with it

Mr. Mirza remarked that the incorporation of Y tank with Hesserghatta tank would have the effect of raising the cost of water supplied from the

latter

latter to 7 annas per 1,000 gallons, whereas the T scheme would enable water to be supplied at 6.8 annas per 1,000 gallons; the financial objection to the new scheme on the ground of increased cost of water therefore disappeared.

General Tarver said that an additional argument in favour of the new scheme was that under it the Durbar bore all risks, and he was definitely in favour of it.

Mr. Russell replied that the Municipality had based their case on Mr. Mulling's report, and according to this, the anticipated yield from the improved Hesserghatta tank would be 6 million gallons daily, which would be sufficient for the needs of the Civil and Military Station and Bangalore City. Mr. Bhore said that Mr. Mulling's report was based on 25 years' average, but climatic conditions seemed to have changed for some reason since 1922 and the 25 years average was not a safe guide as regards the last 6 years. From September 1925 to October 1926 not a drop of water had entered Hesserghatta tank.

Mr. Russell pointed out that another main objection of the Municipal Commission was to their guaranteeing to take a minimum supply of 2½ million gallons daily, as their figure showed that 2 million gallons daily would be the maximum required; if in fact in the past they had never used more than 1.75 million gallons daily. Mr. Bhore said

more than

said that they did not use 1.75 million gallons because they could not do so under the 1914 agreement. General Tarver suggested that if the minimum required by the Durbar were reduced from 2½ to 2 million gallons daily, a compromise might be arrived at, and the scheme got on with: there had already been far too much delay and it was necessary to go ahead. Mr. Mirza Ismail asked whether if the minimum were so reduced any extra water required could be paid for at a higher rate. Mr. Crump and General Tarver expressed themselves as generally in favour of a compromise on these lines

It was decided that it was essential to get the opinion of the Municipal Commission as early as possible on the new points raised at today's meeting, and that as a preliminary thereto there should be a meeting of Mr. Bhore and the technical advisers of the Municipal Commission to check the facts and figures put forward in the note that had been placed before today's meeting by the Chief Engineer, Mysore

Mr. Crump said the two main points to be brought up at the meeting of the Municipal Commission were

1) the question whether a 2 million gallons daily minimum with increased rate for any supply beyond this minimum would be acceptable.

2) the fact that even with the contemplated raising of the weir, Hesserghatta tank alone could not be depended on to produce a sufficient supply of water

Mr. Crump asked Mr. Bhore to attend the meeting of the Municipal Commission to explain matters to the members in person and also requested Mr. Russell to make every endeavour to obtain the Commission's decisions by the middle of June at the latest. Mr. Russell said that if the technical experts agreed to the facts and figures in the Mysore Durbar note, he thought the Commission would be prepared to adopt their conclusions.

The meeting then terminated

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this would be to increase the capital cost of the Hesserghatta scheme by 14 lakhs, which would work out at 2 25 annas per 1,000 gallons extra.

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The meeting then terminated

Note enunciated by Mr. Shore.

Bangalore Water Supply

Minimum supply required -

In January 1913 Major Le Measurier wrote to the Chief Engineer at Mysore re: fixing the draw from the Hesserghatta lake for the decade 1914 to 1924. He said that it would be necessary to raise the supply to the C & M Station to 2 million gallons, if not to 2½ millions. Taking the requirements of the City, at the same figure, the total quantity would be 5 millions. This would mean 20 gallons per head per day, which is not a very liberal allowance for domestic consumption. At a conference held in August 1923 at the Residency, when X Colonel Rolland, Chief Engineer, Southern Command, was present, it was decided to allow 25 gallons. This included an allowance of 5 gallons for water borne sewerage; the rate allowed for domestic consumption being 20 gallons.

## 2 Improvements to Hesserghatta.

The tank surplussed in November 1922. Assuming that the improvement works were completed before November 1922 and the tank was full in January 1923, it is clear from the working tables of receipts and issues appended that the tank would have been empty in Octr: 1923 For a whole year from September 1925 to September 1926 the tank received no supply Three upper tanks were drained and eventually Y tank was reserved. Pumping was started from Y tank from April 1926 and is being continued. But for these measures, there would have been another water famine before October 1928.

The raising of the weir would have safeguarded supply to the extent of 3.5 million gallons per day on one condition, viz, that the tank filled once every third year. But for the past five years, the receipts of have been very poor as will be seen from the figures given below:-

| | | | |
|---|---|---|---|
| Receipts - | 1923 | ... | 317 million c.ft. |
| | 1924 | ... | 312 -do- |
| | 1925 | ... | Nil. |
| | 1926 | ... | 456 -do- |
| | 1927 | ... | 369 -do- |

A daily supply of 3.5 million gallons means, including evoporation and percolation losses, an annual consumption of roughly 600 million c.ft. The receipts have in no year approached this figure. It is therefore evident that Hesserghatta alone cannot be relied upon, even with the weirs raised, and it is necessary to have a permanent reserve.

If the Y tank is reser... as a permanent measure, the capital cost required would be as follows:-

| | | |
|---|---|---|
| 1) | 12 miles 16 inch cast iron pipes | 10,80,000/- |
| 2) | Two new pumping sets. | 15,000/- |
| 3) | Other charges (lump sum) | 5,000/- |
| 4) | Land Compensation | 3,00,000/- |
| | | 14,00,000/- |

With the cost of improvements to the Hesserghatta tank (Rs.7,31,000/-) the total outlay required to ensure a supply of 3.5 million gallons a day would be Rs.21,31,000/-

The additional cost of pumping unfiltered water from Hesserghatta, with Y tank as a permanent reserve, is shewn below:-

| | | |
|---|---|---|
| Interest at 6% on capital cost | Rs. | 1,27,860/- |
| Depreciation at 2½% | " | 57,750/- |
| Total | " | 1,85,610/- |

distributed as under:-

| | |
|---|---|
| City | 92,805/ |
| C & M Station | 92,805/ |

for pumping 1.75 million gallons per day or 638 million gallons per year.

Therefore the extra cost for 1000 gallons is ~~Rsm~~ 2.25 annas.

In this connection it might be pointed out that the present cost of supplying 1000 gallons of unfiltered water has been variously calculated at 4.25, 4.81, and 5.7 annas. But these figures do not take into consideration the cost incurred for the past three years on special measures for supplementing Hesserghatta supply. The cost of these measures is about Rs.3 lakhs for three years or Rs. One lakh per year. This means an addition of about 2.25 annas per 1000 gallon

to the normal cost of supply.

From the above it is clear that unless Hesserghatta fills regularly once every three years, an expectation which the experience of 6 years has falsified, it must be supplemented by X tank; and whether this is done temporarily or as a permanent measure, it is by no means an economical arrangement.

### 3. T. Scheme.

The cost of 1000 gallons of unfiltered water under this scheme has been put down at 6.8 annas on the assumption of a total pumpage of 5 million gallons. It was expected that the City and the O & M Station would each take 2½ million gallons. If the total quantity is reduced to 4 million gallons, the cost per 1000 gallons will be 7.5 annas.

## Bangalore Water Supply.

Statement showing the possibilities of the existing Hesser ghatta lake after improvements and the proposed new reservoir at Thippagondanahalli

| | | Hesserghatta | New Reservoir. |
|---|---|---|---|
| 1. | Total catchment area | 212 square miles | 502 sq: miles. |
| 2. | Direct -do- | 32 -do- | 73 -do-(hilly catchment) |
| 3 | Structural details | Earthern dam with 4' shutters over weir. | Masonry dam. |
| 4. | Depth of water | 30 feet | 100 feet. |
| 5. | Area of water spread | 73.44 millions sq: ft. | 55.08 million sq: ft. |
| 6. | Capacity of reservoir | 997 millions cft. when weir is raised. | 5038 millions cf |
| 7. | Replenishment in every bad years | 151 million cft. | 400 million cft. |
| 8 | Loss by evaporation | 1/2 ft. per month on mean surface area | 1/2 ft. per mont on mean surface area. |
| 9. | Loss by percolation. | 1/7 on the mean capacity | 1/7 on the mean capacity. |
| 10. | Working tables. | | |
| | 6¼ million gallons per day consumption | will last 2 years | will last 5¾ years |
| 11. | -do- 4½ millions gallons | " 2½ " | " 9 years |
| 12. | do- 3½ -do- | " 3 " | No limit with ordinary inflow. |
| 13. | Cost of new reservoir. | | 3.25 lakhs. |

Chammajendi Reservoir.

Working Tables from 1st Jany 923 assuming the F.R.L. weir had been raised to 70.00

| Year | Tank level | Capacity | Receipt | Total | Consumption | Evaporation | Percolation | Total | Balance | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | M.C. ft | M.C. ft | M.C. ft | M.C. ft | M.C. ft | M.C. ft | M.C. ft | M.C. ft | |
| Jany | 70.00 | 900 | 165 | 1162 | 204 | 378 | 08 | 690 | 472 | |
| | 1924 62-3" | 472 | 301 | 773 | 204 | 158 | 64 | 516 | 257 | |
| | 925 57-3" | 257 | Nil | 231 | 170 | 75 | 9 | 25-7 | Nil | The tank has been empty on 1st Nov. |
| Octr | 926 57-5" | 261 | 514 | 775 | 206 | 123 | 39 | 146 | 309 | The Tank received 514 M.C.ft in 24 hrs. |
| Octr | 927 58-8" | 309 | 81 | 390 | 206 | 105 | 21 | 330 | Nil | |
| Oct. | 928 52-8" | 145 | | | | | | | | |

N. B. The quantity of Rain as given in Million Cubic feet
Evaporation assumed at 6 feet for
Spread for the year.
Percolation is assumed at 1/7 the Mean Rainfall for
each during the year.

## Bangalore water supply.

Minimum supply required -

In January 1913 Major Le Fanu wrote to the Chief Engineer of Mysore re. fixing the draw from the Hesserghatta lake for the decade 1914 to 1924. He said that it would be necessary to raise the supply to the C. & M. Station to 2 million gallons, if not to 2½ millions. Taking the requirements of the City, at the same figure, the total quantity would be 5 millions. This would mean 20 gallons per head per day, which is not a very liberal allowance for domestic consumption. At a Conference held in August 1923 at the Residency, when Col. Holland, Chief Engineer, Southern Command, was present, it was decided to allow 25 gallons. This included an allowance of 5 gallons for water borne sewerage the rate allowed for domestic consumption being 20 gallons.

## 2. Improvements to Hesserghatta.

...

The tank surplussed in November 1922. Assuming that the improvement works were completed before November 1922 and the tank was full in January 1923, it is clear from the working tables of receipts and issues appended, that the tank would have been empty in October 1925. For a whole year from September 1925 to September 1926 the tank received no supply. Three upper tanks were drained and eventually Y tank was reserved. Pumping was started from Y tank from April 1926 and is being continued. But for these measures, there would have been another water famine ~~in September 1927~~ January 1928 before Oct 1928.

The raising of the weir would have safeguarded supply to the extent of 3.5 million gallons per day on one condition, viz., that the tank filled once every third year. But for the part five years, the receipts have been very poor as will be seen from the figures given below:-

| | | | |
|---|---|---|---|
| Receipts - | 1923 .. | 317 | million c.ft. |
| | 1924 .. | 312 | do. |
| | 1925 .. | Nil. | |
| | 1926 .. | 456 | do. |
| | 1927 .. | 369 | do. |

A daily supply of 3.5 million gallons means, including evaporation and percolation losses, an annual consumption of

roughly 600 million c.ft. The receipts have in no year approached this figure. It is therefore evident that Hesserghatta alone cannot be relied upon, even with the weirs raised, and it is necessary to have a permanent reserve.

If the Y tank is reserved as a permanen measure, the capital cost required would be as follows:--

| | | Rs. |
|---|---|---|
| (1) | 12 miles 16" inch cast iron pipes.. | 10,80,000 |
| (2) | Two new pumping sets. .. | 15,000 |
| (3) | Other charges (lump sum) .. | 5,000 |
| (4) | Land compensation ... | 3,00,000 |
| | Total .. .. | 14,00,000 |

With the cost of improvements to the Hesserghatta tank (Rs.7,31,000/-) the total outlay required to ensure a supply of 3.5 million gallons a day would be Rs.21,31,000/-

The additional cost of pumping unfilte -ed water from Hesserghatta, with Y tank as a permanent reserve, is shewn below:--

| | | |
|---|---|---|
| Interest at 6% on capital cost .. | Rs. | 1,27,860/- |
| Depreciation at 2½% . | " | 57,750/- |
| Total .. | Rs. | 1,85,610/- |

distributed as under:-

| | | |
|---|---|---|
| City .. .. | " | 92,805/- |
| C. & M. Station .. | " | 92,805/- |

for pumping 1.75 million gallons per day or

638 million gallons per year.

Therefore the extra cost for 1000 gallons is 2.25 annas.

In this connection it might be pointed out that the present cost of supplying 1000 gallons of unfiltered water has been variously calculated at 4.25, 4.81, and 5.7 annas. But these figures do not take into consideration the cost incurred for the past three years on special measures for supplementing Hesserghatta supply. The cost of these measures is about Rs.3 lakhs for three years or Rupees one lakh per year. This means an addition of about 2.25 annas for 1000 gallons, to the normal cost of supply.

From the above it is clear that unless Hesserghatta fills regularly once every three years, an expectation which the experience of 6 years has falsified, it must be supplemented by Y tank; and whether this is done temporarily or as a permanent measure, it is by no means an economical arrangement.

---

## 3. T. Scheme.

The cost of 1000 gallons of unfiltered water under this scheme has been put down at 6.8 annas on the assumption of a total pumpage of 5 million gallons. It was expected that the City and the C & M.

Station would each take 2⅓ million gallons. If the total quantity is reduced to 4 million gallons, the cost per 1000 gallons will be 7.5 annas.

## Bangalore Water Supply.

Statement showing the possibilities of the existing Hesserghatta Lake after improvements and the proposed new Reservoir at Thippagondenahalli.

| | | Hesserghatta. | New Reservoir. |
|---|---|---|---|
| 1. | Total catchment area. | 212 square miles. | 502 sq. miles. |
| 2. | Direct do. | 32 do. | 73 do. (hilly catchment) |
| 3. | Structural details. | Earthen dam with 4' shutters over weir. | Masonry dam. |
| 4. | Depth of water. | 30 feet. | 100 feet. |
| 5. | Area of water spread. | 73.44 Million Sq.ft. | 55.08 Million sq. ft. |
| 6. | Capacity of reservoir | 97 Million Cft. when weir is raised. | 3038 Million Cft. |
| 7. | Replenishment in every bad years. | 141 million Cft. | 288 million Cft. |
| 8. | Loss by evaporation. | 1/2 ft. per month on mean surface area. | 1/2 ft. per month on mean surface area. |
| 9. | Loss by percolation. | 1/7 on the mean capacity. | 1/7 on the mean capacity. |
| 10. | Working Tables. | | |
| | 6½ million gallons per day consumption. | will last 2 years. | Will last 5½ years. |
| 11. | do. 4½ million gallons. | " 2½ " | do. 9 yrs. |
| 12. | do. 3½ do. | " 3 " | No limit with ordinary inflow. |
| 13. | Cost of new reservoir. | | 43.25 lakhs. |

Chamrajendra reservoir.

Working tables from 1st January 1923 assuming that the weir had been raised to 70.00

| Year. | Tank level. | Capacity. | Receipt. | Total. | Consumption. | Evaporation. | Percolation | Total | Balance | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|
| | level. | M.C.ft. | M.C.ft. | M.C.ft | M.C.ft. | M.C.ft | M.C.ft. | M.C.ft. | M.C.ft. | |
| Jan. 1923. | 70.00 | 997 | 165 | 1162 | 204 | 378 | 108 | 690 | 472 | |
| Jan. 1924. | 62-3" | 472 | 301 | 773 | 204 | 283 | 54 | 516 | 257 | |
| Jany. 1925. | 57'-3" | 257 | nil | 257 | 170 | 78 | 9 | 257 | nil. | The tank would be empty on 1st Novr. |
| Oct. 1926. | 57'-5" | 261 | 514 | 775 | 204 | 323 | 39 | 465 | 309 | The tank recd. supply in Septr. 1926. |
| Octr. 1927. | 58'-8" | 309 | 81 | 390 | ~~204~~ 204 ~~113~~ | 108 | 21 | ~~345~~ 330 | ~~145~~ nil | ~~The~~ quantity available on 1.12.27 would be 145 M.c.ft. |
| Octr. 1928. | 58' 8" | 145 | | | | | | | | |

N.B. - The quantity of water is given in million cubic feet.
Evaporation assumed at 6 feet per year on the mean water spread for the year.
Percolation is assumed at 1/7 the mean capacity of the tank during the year.

minimum supply required

In January 1913 Major Le Measurier wrote to the Chief Engineer at Mysore re: fixing the draw from the Hesserghatta lake for the decade 1914 to 1924. He said that it would be necessary to raise the supply to the C & M Station to 2 million gallons, if not to 2½ millions. Taking the requirements of the City, at the same figure, the total quantity would be 5 millions. This would mean 20 gallons per head per day, which is not a very liberal allowance for domestic consumption. At a conference held in August 1923 at the Residency, when Colonel Rolland, Chief Engineer, Southern Command, was present, it was decided to allow 25 gallons. This included an allowance of 5 gallons for water borne sewerage, the rate allowed for domestic consumption being 20 gallons.

## 2. Improvements to Hesserghatta.

The tank surplussed in November 1922. Assuming that the improvement works were com pleted before November 1922 and the tank was full in January 1923, it is clear from the working tables of receipts and issues appended that the tank would have been empty in Octr: ~~1926.~~ 1925 For a whole year from September 1925 to September 1926 the tank received no supply. Three upper tanks were drained and eventually Y tank was reserved. Pumping was started from Y tank from April 1926 and is being continued. But for these measures, there would ~~have been~~ be another water famine before October 1928.

The raising of the weir would have safe-guarded supply to the extent of 3.5 million gallons per day on one condition, viz, that the tank filled once every third year. But for the past five years, the receipts ~~of~~ have been very poor as will be seen from the figures given below:-

| | | | |
|---|---|---|---|
| Receipts - | 1923 | ... | 317 million c.ft. |
| | 1924 | ... | 312 -do- |
| | 1925 | ... | Nil. |
| | 1926 | ... | 456 -do- |
| | 1927 | ... | 369 -do- |

A daily supply of 3.5 million gallons means, including evoporation and percolation losses, an annual consumption of roughly 600 million c.ft. The receipts have in no year approached this figure. It is therefore evident that Hesserghatta alone cannot be relied upon, even with the weirs raised, and it is necessary to have a permanent reserve.

If the Y tank is reserved as a permanent measure, the capital cost required would be as follows:-

to the normal cost of supply.

From the above it is clear that unless Hesserghatta fills regularly once every three years, an expectation which the experience of 6 years has falsified, it must be supplemented by Y tank; and whether this is done temporarily or as a permanent measure, it is by no means an economical arrangement.

3 T. Scheme.

The cost of 1000 gallons of unfiltered water under this scheme has been put down at 6.8 annas on the assumption of ~~a total~~ an average daily pumpage of 5 million gallons. It was expected that the City and the C & M Station would each take 2½ million gallons. If the total quantity is reduced to 4 million gallons, the cost per 1000 gallons will be 7.5 annas.

## Bangalore Water Supply.

Statement showing the possibilities of the existing Hesser ghatta lake after improvements and the proposed new reservoir at Thippagondanahalli

| | | Hesserghatta | New Reservoir. |
|---|---|---|---|
| 1 | Total catchment area | 212 square miles | 502 sq: miles. |
| 2 | Direct -do- | 32 -do- | 73 -do-(hilly catchment) |
| 3 | Structural details | Earthern dam with 4' shutters over weir. | Masonry dam. |
| 4. | Depth of water | 30 feet. | 100 feet. |
| 5 | Area of water spread | 73.44 millions sq: ft. | 55.08 million sq: ft. |
| 6 | Capacity of reservoir | 997 millions cft. when weir is raised. | 3038 millions cft. |
| 7 | Replenishment in every bad years | 151 million cft. | 288 million cft |
| 8 | Loss by evaporation | 1/2 ft. per month on mean surface area | 1/2 ft. per month on mean surface area. |
| 9. | Loss by percolation. | 1/7 on the mean capacity | 1/7 on the mean capacity. |
| 10. | Working tables. | | |
| | 6¼ million gallons per day consumption | will last 2 years | will last 5¼ years |
| 11. | -do- 4½ millions gallons | 2¼ | " 9 years |
| 12. | -do- 3½ -do- | 3 | No limit with ordinary inflow. |
| 13. | Cost of new reservoir | | 43.25 lakhs. |

Chamrajendra Reservoir

Working Tables from 1st January 1925 assuming that the Weir had been raised to 70.00

| Year | Tank Level | Capacity M.C. ft | Receipts M.C. ft | Total M.C. ft | Consumption M.C. ft | Evaporation M.C. ft | Percolation M.C. ft | Total M.C. ft | Balance M.C. ft | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Jan. 1925 | 70.00 | 997 | 165 | 1162 | 264 | 378 | 108 | 690 | 472 | |
| " 1926 | 62-3" | 472 | 301 | 773 | 264 | 258 | 54 | 516 | 257 | |
| " 1925 | 57'-3" | 257 | Nil | 257 | 170 | 78 | 9 | 257 | Nil | The tank has not filled again during the year. |
| Feb. 1926 | 57'-5" | 261 | 514 | 775 | 264 | 225 | 39 | 466 | 309 | The Tank received supply in April 1926. |
| Feb. 1927 | 58'-8" | 349 | 811 | 1160 | | 105 | 21 | 330 | Nil | |
| Oct. 1927 | 53'-5" | 111 | | | | | | | | |

N. B.

[illegible]

Bangalore. 29

18.5.28.

Dear Montgomery.

Your D.O. No 69 T

dt. May 15th forwarding a copy of the Proceedings of the Conference on Bangalore Water supply.

I return the proceedings with a suggestion that Mr. Black should attend the Standing

Proceedings of informal Conference regarding the Bangalore Water Supply held in Awdry House, Ootacamund on the 14th May, 1928, at 10 A.M.

The following were present at the Conference:-

1. The Hon. C.I.E., Resident in Mysore.
2. Major General A. L. Tarver, C.B., C.I.E., D.S.O., G. O. C., Madras District.
3. Mirza Muhammad Ismail, O.B.E., C.I.E. Dewan of Mysor
4. Mr. J. Bhore, Chief Engineer, Mysore.
5. Mr. N. Madhava Rau, Chief Secretary to the Govt. of Mysore.
6. Mr. Venkattasubba Rao, Executive Engineer, Water Supply, Myso
7. Major C. Cobb, C.B.E., D.A.Q.M.G., Madras District.
8. Mr. A. C. Lothian, Secretary designate to the Resident in Mysore.
9. Mr. T. B. Russell, Collector, Civil & Military Station and President of the Municipal Commission.
10. Major K. A. G. Evans-Gordon, Secretary to the Resident.

Before the commencement of the meeting the note, of which a copy is attached below, was circulated by Mr. Bhore explaining that even if the weirs of Hesserghatta tank were raised as originally proposed, that tank could not be relied upon to produce the required supply of 3½ million gallons a day unless the Y. tank was retained as a permanent reserve, and the effect of

this would be to increase the capital cost of the Hesaerghatta scheme by 14 lakhs which would work out at 2.25 annas per 1,000 gallons extra.

Mr. Crump opened the proceedings by inviting Mr. Russell to express his views on the new proposals, as the Municipal Commission were the only dissenters to the new scheme put forwar by the Mysore Durbar for a reservoir at Thippagondanahalli.

Mr. Russell said he had just received the note from the Chief Engineer, Mysore which put rather a new complexion on the Hesserghatta scheme, and if the facts therein stated on investigation proved accurate, some of the main objections of the Municipal Commission to the abandonment of the Hesserghatta scheme in favour of the T scheme would be removed; but he had had no opportunity of analysing the figures or of consulting his Committee, and until he had done so, he was not in a position to say anything definite.

Mr. Bhore pointed out that the most important fact was that the Hesserghatta ~~Ankk~~tank even with the proposed raised weirs would not be able to meet their requirements unless Y tank were incorporated with it.

Mr. Mirza Ismail remarked that the incorporation of Y tank with Hesserghatta tank would have the effect of raising the cost of water supplied from the

tter

latter to 7 annas per 1,000 gallons, whereas the T scheme would enable water to be supplied at 6.8 annas per 1,000 gallons: the financial objection to the new scheme on the ground of increased cost of water therefore disappeared.

General Tarver said that an additional argument in favour of the new scheme was that under it the Durbar bore all risks, and he was definitely in favour of it.

Mr. Russell replied that the Municipality had based their case on Mr. Mulling's report, and according to this, the anticipated yield from the improved Hesserghatta tank would be 6 million gallons daily, which would be sufficient for the needs of the Civil and Military Station and Bangalore City. Mr. Bhore said that Mr. Mulling's report was based on 25 years' average, but climatic conditions seemed to have changed for some reason since 1922 and the 25 years average was not a safe guide as regards the last 6 years. From September 1925 to October 1926 not a drop of water had entered Hesserghatta tank.

Mr. Russell pointed out that another main objection of the Municipal Commission was to their guaranteeing to take a minimum supply of 2½ million gallons daily, as their figure showed that 2 million gallons daily would be the ma mum required: if in fact in the pas they had never used more than 1.75 million gallons daily. Mr. Bhor

said that they did not use more than 1.75 million gallons because they could not do so under the 1914 agreement. General Tarver suggested that if the minimum required by the Durbar were reduced from 2½ to 2 million gallons daily, a compromise might be arrived at, and the scheme got on with: there had already been far too much delay and it was necessary to go ahead. Mr. Mirza Ismail asked whether if the minimum were so reduced, any extra water required could be paid for at a higher rate. Mr. Crump and General Tarver expressed themselves as generally in favour of a compromise on these lines.

It was decided that it was essential to get the opinion of the Municipal Commission as early as possible on the new points raised at today's meeting, and that as a preliminary thereto there should be a meeting of Mr. Bhore and the technical advisers of the Municipal Commission to check the facts and figures put forward in the note that had been placed before today's meeting by the Chief Engineer, Mysore.

Mr. Crump said the two main points to be brought up at the meeting of the Municipal Commission were

(1) the question whether a 2 million gallons daily minimum with increased rate for any supply beyond this minimum would be acceptable.

(2) the fact that even with the contemplated raising of the weir, Hesserghatta tank alone could not be depended on to produce a sufficient supply of water.

Mr. Crump asked Mr. Bhore to attend the meeting of the Municipal Commission to explain matters to the members in person and also requested Mr. Russell to make every endeavour to obtain the Commission's decisions by the middle of June at the latest. Mr. Russell said that if the technical experts agreed to the facts and figure in the Mysore Durbar note, he thought the Commission would be prepared to adopt their conclusions.

The meeting then terminated.

# Bangalore Water Supply.

## Minimum supply required

In January 1923 Major Le Mesurier wrote to the Chief Engineer at Mysore re: fixing the draw from the Hesseighatta lake for the decade 1914 to 1924. He said that it would be necessary to raise the supply of the C & M Station to 2 million gallons, if not to 2½ millions. Taking the requirement of the City, at the same figure, the total quantity would be 5 millions. This would mean 20 gallons per head per day, which is not a very liberal allowance for domestic consumption. At a conference held in August 1925 at the Residency, when Colonel Rolland, Chief Engineer, Southern Command, was present, it was decided to allow 25 gallons. This included an allowance of 5 gallons for water borne sewerage, the rate allowed for domestic consumption being 20 gallons.

2. Improvements to Hesserghatta.

The tank surplussed in November 1922. Assuming that the improvement works were completed before November 1922 and the tank was full in January 1923, it is clear from the working tables of receipts and issues appended that the tank would have been empty in October 1925. For a whole year from September 1925 to September 1926 the tank received no supply. Three upper tanks were drained and eventually Y. Tank was reserved. Pumping was started from Y. Tank from April 1926 and is being continued. But for these measures there would have been another water famine before October 1928.

The raising of the weir would have safeguarded supply to the extent of 3.5 million gallons per day on one condition, viz., that the tank filled once every third year. But for the past five years, the receipts have been very poor as will be seen from the figures given below:-

| | | | |
|---|---|---|---|
| Receipts - | 1923 | ... | 317 million c.ft. |
| | 1924 | ... | 312 -do- |
| | 1925 | ... | Nil |
| | 1926 | ... | 456 do- |
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A daily supply of 3.5 millions gallons means, including evaporation and percolation losses, an annual consumption of roughly 600 million cft The receipts have in no year approached this figure. It is therefore evident that Hesserghatta alone could not be relied upon, even with the weirs raised, and it is necessary to have a permanent reserve.

If the Y Tank is reserved as a permanent measure, the capital cost required would be as follows:-

| | |
|---|---|
| 1) 12 miles 16 inch cast iron pipes. | 10,80,000/- |
| 2) Two new pumping sets | 15,000/- |
| 3) Other charges (lump sum) | 5,000/- |
| 4) Land compensation | 3,00,000/- |
| | 14,00,000/- |

With the cost of improvements to the Hesserghatta tank (Rs.7,31,000/-) the total outlay required to ensure a supply of 3.5 million gallons a day would be Rs.21,31,000/-.

The additional cost of pumping unfiltered water from Hesserghatta, with Y tank as a permanent reserve, is shewn below:-

| | | |
|---|---|---|
| Interest at 6% on capital cost | ... | Rs.1,27,000/- |
| Depreciation at 2½% | ... | " 57,750/- |
| Total | | " 1,85,610/- |

distributed as under:-

| | |
|---|---|
| City ... | " 92,805/- |
| C & M Station | " 92,805/- |

for pumping 1.75 million gallons per day or 638 million gallons per year.

Therefore the extra cost for 1000 gallons is 2.25 annas.

In this connection it might be pointed out that the present cost of supplying 1000 gallons of unfiltered water has been variously calculated at 4.25, 4.81 and 5.7 annas. But these figures do not take into consideration the cost incurred for the past three years on special measures for supplementing Hesserghatta supply. The cost of these measures is about Rs.3 lakhs for three years, or Rs. One lakh per year. This means an addition of about 2,25 annas per 1000 gallons to the normal cost of supply.

From the above it is clear that unless

Hesserghatta fills regularly once every thr years, an expectation which the experience 6 years has falsified, it must be supplement bt the Y. tank; and whether this is done temporarily or as a permanent measure, it is by no means an economical arrangement.

3. T. Scheme.

The cost of 1000 gallons of unfiltered water under this scheme has been put down at 6.8 annas on the assumption of a total pumpage of 5 million gallons. It was expected that the City and the C & M Station would each take 2½ million gallons. If the total quantity is reduced to 4 million gallons, the cost per 1000 gallons will be 7.5 annas.

Bangalore Water Supply.

Statement showing the possibilities of the existing Hesserghatta lake after improvements and the proposed new ~~weir~~ reservoir at Thippagondnalli.

| | | Hesserghatta | New reservoir. |
|---|---|---|---|
| 1. | Total catchment area | 212 square miles | 502 sq: miles. |
| 2. | Direct - do - | 32 -do- | 73 -do-(hilly catchment) |
| 3. | Structural details | Earthern dam with 4' shutters over weir. | Masonry dam. |
| 4. | Depth of water | 30 feet | 100 feet. |
| 5. | Area of water spread | ~~73x742~~ 73.44 millions sq. ft. | 55.08 millin sq. m. ft. |
| 6. | Capacity of reservoir | 997 million c-ft when weir is raised | 3038 millions cft |
| 7. | Replenishment in very bad years | 151 million cft. | 288 million cft. |
| 8. | Loss by evaporation | 1/2 ft. per month on mean surface area | 1/2 ft. per month on mean surface area. |
| 9. | Loss by percolation | 1/7 on the mean capacity | 1/7 on the mean capacity. |
| 10. | Working tables | | |
| | 6¼ million gallons per day consumption | Will last 2 years. | Will last 5¼ year |
| 11. | -do- 4¼ million gallons | " 2¼ " | " 9 " |
| 12. | -do- 3½ -do- | " 3 " | No limit with ordinary inflow. |
| 13. | Cost of new reservoir. | | 43.25 lakhs. |

# Chamrajendra Reservoir.

## Working Tables from 1st January 1923 assuming that the weir has been raised to 70.00.

| Year | Tank level | Capacity M.C. ft. | Receipt M.C. ft. | Total M.C.ft. | Consumption M.C. ft. | Evaporation M.C. ft. | Percolation M.C. ft. | Total M.C.ft. | Balance M.C. ft. | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| Jany 1923 | 70.00 | 992 | 165 | 1162 | 204 | 378 | 108 | 690 | 472 | |
| " 1924 | 62-3" | 472 | 301 | 773 | 204 | 258 | 54 | 516 | 257 | |
| " 1925 | 57-3" | 257 | Nil | 237 | 170 | 78 | 9 | 257 | Nil | The Tank would be empty on 1st Nov: |
| Oct. 1926 | 57-5" | 261 | 514 | 775 | 204 | 223 | 39 | 466 | 309 | The Tank received supply in Sept. 1926 |
| Oct. 1927 | 58'-8" | 309 | 81 | 390 | 204 | 105 | 21 | 330 | Nil | |
| Oct. 1928 | 53'-8" | 145 | | | | | | | | |

N.B. The quantity of water is given in Million Cubic feet.
Evaporation assumed at 6 feet per year on the mean water spread for the year.
Percolation assumes at 1/7 the mean Capacity of the tank during the year.

Aubrey House
Terrace 29
19th May '28

Dear Lothian.

Copies of Proceedings of Conference on Bangalore Water Supply, sent to Russell, are returned herewith to go/ther with his letter on the subject.

I read the letter to Resident who said that Russell might do as he liked about Bhore but

50

From - The Assistant Secretary to the Government of India
in the Foreign and Political Department,

To - The Hon'ble the Resident in Mysore.

RESIDENT'S OFFICE,
28(5)28
BANGALORE.
Number 4580
Date of Receipt 23/5/28

Memorandum No.180(13)-A/25.
Dated Simla, the 18th May 1928.

IMPROVEMENTS TO BANGALORE WATER SUPPLY.

Reference correspondence ending with the Foreign and Political Department telegram No.180(13)-A., dated the 9th March 1928.

2. The Government of India would be glad to be informed, at an early date, of the progress made in the preparation of the new scheme.

Sd. K. Sanjiva Row,
Assistant Secretary to the Government of India

Attested.

E. C. Ollo.
Superintendent,
Foreign and Political Department

RESIDENT'S OFFICE,
BANGALORE.
Diary No. 4641
Date of Receipt 25/5/28



HEADQUARTERS, MADRAS DISTRICT,
CAMP OFFICE,
WELLINGTON (S. INDIA).

19th May 1928.

Dear Montgomery.

Reference your D.O.No70-T of 15th instant. I ~~return herewith~~ have kept the copy of the Proceedings of the Conference on the Bangalore Water Supply for record.

I have no remarks or corrections to make . I agree entirely with the proposals.

Yours sincerely
C Coop

Passed.
to.

Secretary to the Resident in Mysore
Awdry House
Fernhill
Nilgiris.

21/5

Office OCC
23/5

# Bangalore Water Supply.

Minimum supply required -

In January 1913 Major Le Measurier wrote to the Chief Engineer of Mysore re. fixing the draw from the Hessarghatta lake for the decade 1914 to 1924. He said that it would be necessary to raise the supply to the C. & M. Station to 2 million gallons if not to 2½ millions. Taking the requirements of the City, at the same figure, the total quantity would be 5 millions. This would mean 20 gallons per head per day, which is not a very liberal allowance for domestic consumption. At a Conference held in August 1923 at the Residency, when Col. Rolland, Chief Engineer, Southern Command, was present, it was decided to allow 25 gallons. This included an allowance of 5 gallons for water borne sewerage the rate allowed for domestic consumption being 20 gallons.

## 2. Improvements to Hesserghatta.

The tank surplussed in November 1922. Assuming that the improvement works were completed before November 1922 and the tank was full in January 1923, it is clear from the working tables of receipts and issues appended, that the tank would have been empty in October 1925. For a whole year from September 1925 to September 1926 the tank received no supply. Three upper tanks were drained and eventually Y tank was reserved. Pumping was started from Y tank from April 1926 and is being continued. But for these measures, there would have been another water famine ~~in September 1927~~ before Oct 1928.

The raising of the Weir would have safeguarded supply to the extent of 3.5 million gallons per day on one condition, viz., that the tank filled once every third year. But for the part five years, the receipts have been very poor as will be seen from the figures given below:-

| | | | |
|---|---|---|---|
| Receipts - | 1923 .. | 317 | million c.ft. |
| | 1924 .. | 312 | do. |
| | 1925 .. | Nil. | |
| | 1926 .. | 456 | do. |
| | 1927 .. | 369 | do. |

A daily supply of 3.5 million gallons means, including evoporation and percolation losses, an annual consumption of

roughly 600 million c.ft. The receipts have in no year approached this figure. It is therefore evident that Hesserghatta alone cannot be relied upon, even with the weirs raised, and it is necessary to have a permanent reserve.

If the Y tank is reserved as a permanent measure, the capital cost required would be as follows:--

| | | Rs. |
|---|---|---|
| (1) | 12 miles 16" inch cast iron pipes.. | 10,80,000 |
| (2) | Two new pumping sets. .. | 15,000 |
| (3) | Other charges (lump sum) .. | 5,000 |
| (4) | Land compensation .. | 3,00,000 |
| | Total .. .. | 14,00,000 |

With the cost of improvements to the Hesserghatta tank (Rs.7,31,000/-) the total outlay required to ensure a supply of 3.5 million gallons a day would be Rs.21,31,000/-

The additional cost of pumping unfilter-ed water from Hesserghatta, with Y tank as a permanent reserve, is shewn below:--

| | | |
|---|---|---|
| Interest at 6% on capital cost .. | Rs. | 1,27,860/- |
| Depreciation at 2½% . | " | 57,750/- |
| Total .. | Rs. | 1,85,610/- |

distributed as under:-

| | | |
|---|---|---|
| City .. .. | " | 92,805/- |
| C. & M. Station .. | " | 92,805/- |

for pumping 1.75 million gallons per day or

638 million gallons per year.

Therefore the extra cost for 1000 gallons is 2.25 annas.

In this connection it might be pointed out that the present cost of supplying 1000 gallons of unfiltered water has been variously calculated at 4.25, 4.81, and 5.7 annas. But these figures do not take into consideration the cost incurred for the past three years on special measures for supplementing Hesserghatta supply. The cost of these measures is about Rs.3 lakhs for three years, or Rupees one lakh per year. This means an addition of about 2.25 annas for 1000 gallons, to the normal cost of supply.

From the above it is clear that unless Hesserghatta fills regularly once every three years, an expectation which the experience of 6 years has falsified, it must be supplemented by Y tank; and whether this is done temporarily or as a permanent measure, it is by no means an economical arrangement.

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## 3. T. S c h e m e .

The cost of 1000 gallons of unfiltered water under this scheme has been put down at 6.8 annas on the assumption of a total pumpage of 5 million gallons. It was expected that the City and the C & M.

Station would each take 2½ million gallons. If the total quantity is reduced to 4 million gallons, the cost per 1000 gallons will be 7.5 annas.

## Bangalore water Supply.

Statement showing the possibilities of the existing Hesserghatta Lake after improvements and the proposed new Reservoir at Thippagondanahalli.

| | | Hesserghatta. | New Reservoir. |
|---|---|---|---|
| 1. | Total catchment area. | 212 square miles. | 502 sq. miles. |
| 2. | Direct do. | 32 do. | 73 do. (hilly catchment) |
| 3. | Structural details. | Earthen dam with 4' shutters over weir. | Masonry dam. |
| 4. | Depth of water. | 30 feet. | 100 feet. |
| 5. | Area of water spread. | 73.44 Million Sq.ft. | 55.08 Million sq. ft. |
| 6. | Capacity of reservoir | 997 Million Cft. When weir is raised. | 3038 Million Cft. |
| 7. | Replenishment in every bad years. | 151 million Cft. | 288 million Cft. |
| 8. | Loss by evaporation. | 1/2 ft. per month on mean surface area. | 1/2 ft. per month on mean surface area. |
| 9. | Loss by percolation. | 1/7 on the mean capacity. | 1/7 on the mean capacity. |
| 10. | Working Tables. | | |
| | 6½ million gallons per day consumption. | [illegible] years. | [illegible] years. |
| 11. | do. 4½ million gallons. | 2½ " | do. 9 yrs. |
| 12. | do. 3½ do. | 3 " | No limit with ordinary inflow. |
| 13. | Cost of new Reservoir. | | 43.25 lakhs. |

Chamarajendra Reservoir.

Working tables from 1st January 1923 assuming that the weir had been raised to 70.00

| Year. | Tank level. level. | Capacity. M.C.ft. | Receipt. M.C.ft. | Total. M.c.ft | Consumption. M.C.ft. | Evaporation. M.C.ft | percolation M.Cft. | Total M.cft. | Balance M.cft. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|
| Jan. 1923. | 70.00 | 997 | 165 | 1162 | 204 | 378 | 108 | 690 | 472 | |
| Jan. 1924. | 62-3" | 472 | 301 | 773 | 204 | 258 | 54 | 516 | 257 | |
| Jany. 1925. | 57'-3" | 257 | nil | 257 | 170 | 78 | 9 | 257 | nil. | The tank would be empty on 1st Novr. |
| Octr. 1926. | 57'-5" | 261 | 514 | 775 | 204 | 223 | 39 | 466 | 309 | The tank recd. supply in Septr. 1926. |
| Octr. 1927. | 58'-8" | 309 | 81 | 390 | ~~119~~ 104 | 105 | 21 | ~~345~~ 330 | ~~145~~ 74 | The quantity available on 1.1928 would be 145 M.c.ft. |
| Octr. 1928. | 53' 8" | 145 | | | | | | | | |

N.B. - The quantity of water is given in million cubic feet.
Evaporation assumed at 6 feet per year on the mean water spread for the year.
Percolation is assumed at 1/7 the mean capacity of the tank during the year.

CONFIDENTIAL
No.C/6016/778

THE RESIDENCY,
Bangalore.
25th May, 1928.

Dear Sir

With reference to your D.O. letter of the 18th May, 1928, I am desired to forward a copy of the Proceedings of the Conference held on the 14th May, 1928, in their final form.

The Resident says that you may do as you like about Mr. Bhore, but that you should give him a chance of putting his case before the Commission, and the Commission an opportunity of cross-examining Mr. Bhore.

Yours truly,
Sd/- W. Stewart.

To,
T.B. Russell, Esq., I.C.S.,
President, Municipal Commission,
C & M Station. Bangalore.

32
C

Proceedings of informal Conference regarding the Bangalore Water Supply held in Awdry House, Ootacamund on the 14th May, 1928, at 10 A.M.

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The following were present at the Conference:-

1. The Hon'ble Mr. L. M. Crump, C.I.E.,
   Resident in Mysore.

2. Major General A. L. Tarver, C.B., C.I.E., D.S.O.,
   General Officer Commanding,
   Madras District.

3. Mirza Muhammad Ismail, Esq., O.B.E., C.I.E.,
   Dewan of Mysore.

4. Mr. J. Bhore,
   Chief Engineer, Mysore.

5. Mr. N. Madhava Rao,
   Chief Secretary to the Government of Mysore.

6. Mr. Venkatasubba Rao,
   Executive Engineer,
   Water Supply, Mysore.

7. Major C. Cobb, C.B.E.,
   Deputy Assistant Quarter Master General,
   Madras District.

8. Mr. A. C. Lothian,
   Secretary designate to the Resident in Mysore.

9. Mr. T. B. Russell,
   Collector, Civil & Military Station and
   President of the Municipal Commission.

10. Major K. A. G. Evans-Gordon,
    Secretary to the Resident.

Before the commencement of the meeting the note, of which a copy is attached below, was circulated by Mr. Bhore explaining that even if the weirs of Hessaraghatta Tank were raised as originally proposed, that tank could not be relied upon to produce the required supply of 3½ million gallons a day unless the Y. tank was retained as a permanent reserve, and the effect of this would be to increase the capital cost of the Hessaraghatta scheme by 14 lakhs which would work out at 2.25 annas per 1,000 gallons extra.

Mr. Crump opened the proceedings by inviting Mr. Russell to express his views on the new proposals, as the Municipal Commission were the only dissenters to the new scheme put forward by the

the Mysore Darbar for a reservoir at Thippagondanahalli.

Mr. Russell said he had just received the note from the Chief Engineer, Mysore which put rather a new complexion on the Hessaraghatta scheme, and if the facts therein stated on investigation proved accurate, some of the main objections of the Municipal Commission to the abandonment of the Hessaraghatta scheme in favour of the T scheme would be removed; but he had had no opportunity of analysing the figures or of consulting his Committee, and until he had done so, he was not in a position to say anything definite.

Mr. Bhore pointed out that the most important fact was that the Hessaraghatta tank even with the proposed raised weirs would not be able to meet their requirements unless Y tank were incorporated with it.

Mr. Mirza Ismail remarked that the incorporation of Y tank with Hessaraghatta tank would have the effect of raising the cost of water supplied from the latter to 7 annas per 1,000 gallons, whereas the T scheme would enable water to be supplied at 6.8 annas per 1,000 gallons: the financial objection to the new scheme on the ground of increased cost of water therefore disappeared.

General Tarver said that an additional argument in favour of the new scheme was that under it the Darbar bore all risks, and he was definitely in favour of it.

Mr. Russell replied that the Municipality had based their case on Mr. Mulling's report, and according to this, the anticipated yield from the improved Hessaraghatta tank would be 6 million gallons daily, which would be sufficient for the needs of the Civil and Military Station and Bangalore City. Mr. Bhore said that Mr. Mulling's report was based on 25 years' average, but climatic conditions seemed to have changed for some reason since 1922 and the 25 years average was not a safe guide as regards the last 6 years. From September 1925 to October 1926 not a drop of water had entered Hessaraghatta tank

Mr.

Mr. Russell pointed out that another main objection of the Municipal Commission was to their guaranteeing to take a minimum supply of 2½ million gallons daily, as their figure showed that 2 million gallons daily would be the maximum required: in fact in the past they had never used more than 1.75 million gallons daily. Mr. Bhore said that they did not use more than 1.75 million gallons because they could not do so under the 1914 agreement. General Tarver suggested that if the minimum required by the Darbar were reduced from 2½ to 2 million gallons daily, a compromise might be arrived at, and the scheme got on with: there had already been far too much delay and it was necessary to go ahead. Mr. Mirza Ismail asked whether if the minimum were so reduced, any extra water required could be paid for at a higher rate. Mr. Crump and General Tarver expressed themselves as generally in favour of a compromise on these lines.

It was decided that it was essential to get the opinion of the Municipal Commission as early as possible on the new points raised at to-day's meeting, and that as a preliminary thereto there should be a meeting of Mr. Bhore and the technical advisers of the Municipal Commission to check the facts and figures put forward in the note that had been placed before to-day's meeting by the Chief Engineer, Mysore.

Mr. Crump said the two main points to be brought up at the meeting of the Municipal Commission were

(1) the question whether a 2 million gallons daily minimum with increased rate for any supply beyond this minimum would be acceptable.

(2) the fact that even with the contemplated raising of the weir, Hessaraghatta tank alone could not be depended on to produce a sufficient supply of water.

Mr. Crump asked Mr. Bhore to attend the meeting of the Standing Committee of the Municipal Commission to explain matters to the members in person and also requested Mr. Russell to make every endeavour to obtain the Commission's decisions by the middle of June at the latest. Mr. Russell said that if the technical experts agreed to the facts and figures in the Mysore Darbar note, he

he thought the Commission would be prepared to adopt their conclusions.

The meeting then terminated.

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BJ

# Bangalore Water Supply.

## Minimum supply required.

In January 1923 Major Le Mesurier wrote to the Chief Engineer at Mysore regarding fixing the draw from the Hessaraghatta lake for the decade 1914 to 1924. He said that it would be necessary to raise the supply of the Civil & Military Station to 2 million gallons, if not to 2½ millions. Taking the requirement of the City, at the same figure, the total quantity would be 5 millions. This would mean 20 gallons per head per day, which is not a very liberal allowance for domestic consumption. At a conference held in August 1923 at the Residency, when Colonel Rolland, Chief Engineer, Southern Command, was present, it was decided to allow 25 gallons. This included an allowance of 5 gallons for water borne sewerage. the rate allowed for domestic consumption being

## 2. Improvements to Hessaraghatta.

The tank surplussed in November 1922. Assuming that the improvement works were completed before November 1922 and the tank was full in January 1923, it is clear from the working tables of receipts and issues appended that the tank would have been empty in October 1925. For a whole year from September 1925 to September 1926 the tank received no supply. Three upper tanks were drained and eventually Y. Tank was reserved. Pumping was started from Y. Tank from April 1926 and is being continued. But for these measures there would have been another water famine before October 1928.

The raising of the weir would have safeguarded supply to the extent of 3.5 million gallons per day on one condition, viz., that the tank filled once every third year. But for the past five years, the receipts have been very poor as will be seen from the figures given below:-

| | | |
|---|---|---|
| Receipts - 1923 | .. | 317 million c.ft. |
| 1924 | .. | 312 -do- |
| 1925 | .. | Nil. |
| 1926 | .. | 456 -do- |
| 1927 | .. | 369 -do- |

A daily supply of 3.5 millions gallons means, including evaporation and percolation losses, an annual consumption of roughly 600 million cft. The receipts have in no year approached this figure. It is therefore evident that Hessaraghatta alone could not be relied upon, even with the weirs raised, and it is necessary to have a permanent reserve.

If the Y Tank is reserved as a permanent measure, the capital cost required would be as follows:-

| | |
|---|---|
| (1) 12 miles 16 inch cast iron pipes. | 10,80,000/- |
| (2) Two new pumping sets. | 15,000/- |
| (3) Other charges (lump sum). | 5,000/- |
| (4) Land compensation. | 3,00,000/- |
| | 14,00,000/- |

With the cost of improvements to the Hessaraghatta tank 7,31,000/-) the total outlay required to ensure a supply of million gallons a day would be Rs. 21,31,000/-.

The

The additional cost of pumping unfiltered water from Hessaraghatta, with Y tank as a permanent reserve, is shewn below:-

| | |
|---|---|
| Interest at 6% on capital cost. | Rs.1,27,000/- |
| Depreciation at 2½% .. | Rs. 57,750/- |
| Total. | Rs.1,85,610/- |

distributed as under:-

| | |
|---|---|
| City. .. .. .. | 92,805/- |
| Civil & Military Station. .. | 92,805/- |

for pumping 1.75 million gallons per day or 638 million gallons per year.

Therefore the extra cost for 1,000 gallons is 2.25 annas.

In this connection it might be pointed out that the present cost of supplying 1000 gallons of unfiltered water has been variously calculated at 4.25, 4.81 and 5.7 annas. But these figures do not take into consideration the cost incurred for the past three years on special measures for supplementing Hessaraghatta supply. The cost of these measures is about Rs.3 lakhs for three years, or Rs.one lakh per year. This means an addition of about 2.25 annas per 1,000 gallons to the normal cost of supply.

From the above it is clear that unless Hessaraghatta fills regularly once every three years, an expectation which the experience of 6 years has falsified, it must be supplemented by the Y. tank; and whether this is done temporarily or as a permanent measure, it is by no means an economical arrangement.

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3. T. Scheme.

The cost of 1000 gallons of unfiltered water under this scheme has been put down at 6.8 annas on the assumption of a total pumpage of 5 million gallons. It was expected that the City and the Civil & Military Station would each take 2½ million gallons. If the total quantity is reduced to 4 million gallons, the cost per 1000 gallons will be 7.5 annas.

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## Bangalore Water Supply.

Statement showing the possibilities of the existing Hessaraghatta lake after improvements and the proposed new reservoir at Thippagondanahalli.

| | | Hessaraghatta | New reservoir. |
|---|---|---|---|
| 1. | Total catchment area | 212 square miles. | 502 square miles. |
| 2. | Direct -do- | 32 -do- | 73 -do- (hilly catchment). |
| 3. | Structural details | Earthern dam with 4' shutters over weir. | Masonry dam. |
| 4. | Depth of water. | 30 feet. | 100 feet. |
| 5. | Area of water spread. | 73.44 millions sq. ft. | 55.08 million sq.ft. |
| 6. | Capacity of reservoir | 997 million c.ft. when weir is raised. | 3038 millions c.ft. |
| 7. | Replenishment in very bad years. | 151 million c.ft. | 288 million c.ft. |
| 8. | Loss by evaporation | 1/2 ft. per month on mean surface area. | 1/2 ft. per month on mean surface area. |
| 9. | Loss by percolation. | 1/7 on the mean capacity. | 1/7 on the mean capacity. |
| 10. | Working tables | | |
| | 6¼ million gallons per day consumption. | Will last 2 years. | Will last 5¼ year |
| 11. | -do- 4½ million gallons. | " 2¼ years. | " 9 years |
| 12. | -do- 3½ -do- | " 3 " | No limit with ordinary inflow. |
| 13. | Cost of new reservoir. | | 43.25 lakhs. |

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BJ

## CHAMRAJENDRA RESERVOIR.

Working Tables from 1st January 1923 assuming that the weir had been raised to 70.00

| Year. | Tank level level. | Capacity M.c.ft. | Receipt. M.c.ft. | Total. M.c.ft. | Consumption. M.c.ft. | Evaporation M.c.ft. | Percolation M.c.ft. | Total M.c.ft. | Balance M.c.ft. | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| January 1923 | 70.00 | 997 | 165 | 1,162 | 204 | 378 | 108 | 690 | 472 | |
| " 1924 | 62.3 | 472 | 301 | 773 | 204 | 258 | 54 | 516 | 257 | |
| " 1925 | 57.3 | 257 | - | 237 | 170 | 78 | 9 | 257 | - | The tank would be empty on 1st Novr. |
| October 1926 | 57.5 | 261 | 514 | 775 | 204 | 223 | 39 | 466 | 309 | The tank received supply in September 1926. |
| 1927 | 58.8 | 309 | 81 | 390 | 204 | 105 | 21 | 330 | - | |
| 1928 | 53.8 | 145 | | | | | | | | |

N.B. The quantity of water is given in Million Cubic feet.
Evaporation assumed at 6 feet per year on the mean water spread for the year.
Percolation assumed at 1/7th mean capacity of the tank during the year.

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_____ DEPARTMENT. File No.

_____ BRANCH. Serial No.

**Draft** Letter / Memorandum / Telegram

No. 5157 Dated 29 May 1928.

Class for telegrams — Ordinary / Express / Urgent* / Priority / Clear Line† — *Only for Foreign Telegrams. †Not for Foreign Telegrams.

Heading :

Case or Diary No. _____

If post copy of telegram required _____

Date of despatch of above _____

List of enclosures _____

(Code word for telegrams.)

From The Secy to the Resident

To The Garrison Engineer, Bangalore

Improvements to Bangalore Water Supply

Sir,

At the instance of the Govt of India, I am directed to request that you will kindly inform me at an early date, of the progress made in the preparation of the new scheme.

I have, &c.

for Secy to the Resident

CASE 29/5/28

S. 5.

MGIPC—FP—460DCFMis.—(289)—2-2-25—30,000 Pads.

Bangalore.

34

Dated Aug. 26th

Registered No. 4786

Date of Receipt 31/8/28.

SW-32
Gaan440
Pag 2

My dear Lothian,

Reference Capt. Sherwood's confidential D.O.No. C/6016/778.d.May. ~~18~~ 25th re Bangalore Water Supply, ~~owing~~ as the new Garrison Engineer Major Papillon has only just taken over charge and knows nothing about the Water Supply it has not been possible for him to check the facts and figures in Mr. Bhore's note yet. I saw Mr. Bhore on Saturday and went into certain preliminary points with him but it will not be possible to have the matter fully gone into between him and the Garrison Engineer before the 10th or 15th of June and I see no possibility of getting it before the Commission before the end of the month at the soonest.

Yours sincerely.

H Mitchell.

(Mr. Bhore will be in Mysore for the next week or more)

NO: 5223

Office of the Garrison Engineer,

Bangalore, Dated, 30th May, 1928.

1/1/16

31

RECD. OFFICE OF THE
BANGALORE.
Inward No. 4834
Date of Receipt 1/6/28

The Secretary, to

the Hon'ble the Resident in Mysore,

BANGALORE.

SUBJECT: Improvements to Bangalore Water Supply.

Sir,

With reference to your No:5157/45-1899 of 29-5-28, I have the honour to inform you that progress in the preparation of the new scheme is, I understand, suspended on account of the scheme not yet having been accepted by all the parties concerned.

The Military Department has accepted the scheme in principle, but the City and Municipal Commissions have not yet accepted it.

I have the honour to be,

Sir,

Your obedient servant,

A. K. Bagnall

MAJOR, R.E

Garrison Engineer, Bangalore

No. 5547
778-1926

From

The Hon'ble Mr. L. M. Crump; C.I.E., I.C.S.,
Resident in Mysore.

To

The Political Secretary to the Government of India,
Foreign and Political Department.

Dated Bangalore 11 June 1928.

Improvements to Bangalore Water Supply.

Sir,

S.N. 30. O
ara. 141 (Rev)
Pag F.

With reference to the correspondence ending with your Memorandum No. 180 (13)-A/25, dated the 18th May, 1928, I have the honour to state that progress in the preparation of the new scheme is temporarily at a stand still on account of the scheme not having been accepted by all the parties concerned. The military authorities have accepted the scheme in principle but the Bangalore City Municipality and the Municipal Commission of the Civil & Military Station of Bangalore have not done so as yet. I am doing my best to have the matter expedited.

I have the honour to be,
Sir,
Your most obedient servant,

o/c

for R E S I D E N T.

BJ

1:9/7

Dated the 7th July 1928.

Jagatsons Water Supply.

My dear Lothian.

Your D.O.No. 6371 of July 6th

It has not been possible to lay the matter before the Standing Committee of the Commission yet as although I have been in close touch with Col. Bingay and Mr. Bhore we have not been able to formulate definite proposals in accordance with the proposals of the Conference at Ootacamund. Both Col. Bingay and Mr. Bhore agree with me that the tentative suggestion made there that the Municipality should pay at a higher rate if they took more than two million gallons daily was not a sound one. Col. Bingay does not think that the Military Engineering Authorities of the Government of India would agree to it. It seemed to us preferable that the Municipality should, if necessary, pay at a slightly higher rate if they took two million gallons and that the Durbar's original offer of 6.8 annas per 1,000 gallons for two and a half million should hold good. With Mr. Crump's approval I discussed this informally with the Dewan and he now agrees with our views. The present proposal is that the Municipality should pay at 7 annas per 1,000 gallons for two million gallons and at 6.8 for anything above that.

Col. Bingay still feels that he would like to look further into the Durbar figures and hopes to have finished doing so in the course of the next few days. Might I suggest another

RESIDENT'S OFFICE
BANGALORE
Register No. 5885
Date of Receipt 9/7/28.



Conference on the lines of the Ooty one in about ten days time. We should then be in a position to formulate a satisfactory proposal in terms of money or if there is still any disagreement about this to arrange that the scheme should be proceeded with, leaving the question of cost to be worked out later.

I do not feel that I am yet in a position to ask Colonel Bingay and Mr. Bhore to meet the Standing Committee, but I may be able to do so before the meeting of the Conference which I now suggest.

Yours sincerely.

J. B. Thomas

To

A. C. Lothian, Esq., I.C.S.,
Secretary to the Resident,
Bangalore.

W. 20/7/28

Headquarters, Madras Dist.
C. R. E's Office,
Bangalore, 17th July 1928.

Dear Mr. Crump

2183
20/7/28

With reference to the informal Conference at the Residency on the 14th.

I enclose a short note which I am giving to the Chief It shortly gives the situation at the moment. I have shown it to General Tarver and he agrees with it.

As regards details in support of the statement in para 8, I saw Bhore yesterday and talked over the points raised in the minute I read you. He agreed that the omission to give credit for the value of Hesserghatta (5 lakhs) in working out the rate per thousand gallons was an over sight. He quite agreed to measurement of filtered water at High Ground Reservoir and undertook to give a rate supported by data. (At present there is no data to support the 6.8 rate, the only data there ~~was~~ is, supports a 6.5 rate) We discussed shifting the filters to the dam site but in the end it appears advisable to keep them at Hebbal as some of the Mills in Bangalore City will want unfiltered water.

Russell and Lothian had a talk on the 14th about Ways and Means that was a little above my head but they don appear to be in absolute despair about it.

I ~~informed~~ told Russell the gist of my talk with Bhore yesterday.

Yours sincerely,

N. L. Bingay

98/a

Note by Lt.Col.H.L.Bingay,R.E.,C.R.E.Madras District
on the
"Notes for H.E.the C-in-C's Tour"
"July 1928".

Bangalore Water Supply.-

1. The C.R.E.occupies an unusual position as regards this water supply. By the agreements he is entrusted by the Government of India with the "execution maintenance, management and control" of Station water supply works both as regards Civil and Military. He therefore reports to the Residency as regards the Civil and the District as regards the Military. This division of responsibility arises from the fact that Bangalore is a C. & M. Station and not a Cantonment.

2. It is not generally realized what a small amount of water the Military in the C.& M.Station use compared with the Civil inhabitants of the Station. The Military do not use more than about 1/10.

3. Therefore it is a small [illegible] for the Military to agree to the Mysore proposals as regards their financial effect.

4. The official primarily concerned financially is the President of the C.& M.Station Commission but unfortunately he was not kept in touch with developments till recently. The proposals will increase his water supply budget by a very large amount principally owing to the fact that the Station is not charged interest on capital cost by the Government of India on the present Hesserghatta installation.

5. Now the station, both Military and Civil, does not want Mysore to quote a rate per thousand gallons for unfiltered water delivered to the Jewell filters at Hebbal. (see para 7 of Notes) What the station wants is a rate per thousand gallons of filtered water delivered at High Ground Reservoir and metered there.

6. The first proposal would perpetuate the dual control of the Jewell Filters and a continuance of

"the atmosphere of suspicion and distrust" as between Mysore and the Station which the improved Hesserghatta Scheme mentioned in para 2 of the Notes would have done away with.

7. Therefore the Resident and the District Commander have authorised the initiation of negotiations with Mysore to fix a rate per thousand gallons for filtered water delivered to High Ground Reservoir.

8. The situation now is that good progress is being made with the rate negotiations and that the President of the Station Commission is going into Ways and Means with the Residency but of course definite proposals cannot be put forward to the Government of India till the rate is agreed upon.

Bgdm
17/7/28

Lt.Col.R.E
C. R. E. Madras District.

C. R. E's Office,
Bangalore, 6th August 1928.

RESIDENT'S OFFICE
BANGALORE.
Register No. 7716
Date of receipt 6/8/28
Dis No.

Dear Latham

SN.38 In continuation of my D.O. of 17th July 1928, to Mr.Crump to which was attached a copy of a note of mine for H.E.the Commander-in-Chief.

2. Mr. Bhore and I have had several talks together since the gathering at 'T' tank on 18-7-1928 when the Chief, Mr.Crump, General Tarver, Russell, Mr.Bhore etc. were present.

3. The question of scrapping the filters at Hebbal and constructing new ones at 'T' tank was gone into again and it was found to be so advantageous to build the new ones at 'T' tank that Mr.Bhore has put it up to his Bangalore Water Supply Committee and I understand that the Mysore Government are going to do this.

4. I attach a list of Heads of agreement which I gave Mr.Bhore to discuss with his people.

5. I think the rates in Head 3 are still a bit high but Mysore are naturally chary about quoting too low a rate. Therefore I suggested Heads 1, 4 & 5. If they make money it will be devoted to an improvement to the supply which will be essential eventually. If they lose money the rates can be reconsidered after 5 years.

6. Head 2 is to facilitate acceptance by C.& M. Station Commission. Mr.Bhore has always stated that this was the intention but I thought it as well to get it down on paper.

7. This list of Heads does not profess to be a complete one, of course, but merely defines the points we have been discussing. There are one or two safeguarding arbitration etc. clauses which will be required.

8.

8. I last saw Mr.Bhore on 30th July and he said his Government hoped to make a definite proposal on the 1st August but of course the riots have intervened and delayed things. I think the proposal was to be made to the Residency but Bhore did not say.

9. I think Simla has a picture in its mind that Mysore have a cut and dried scheme ready, considered to "the last button," and are merely waiting for the station to agree. This is far from being the case. During my talks with Mr.Bhore it was evident that there were many alternative schemes being discussed. They do not affect fundamentals and their discussion is all to the good but they do affect rates and I think the Resident ought to know that the printed report dated 1-7-1927 does not give the last word by any means.

10. Russell assembled the Commission Standing Committee on the 2nd August as I had hoped to have Bhore's definite rates by then. However these not being available the matter was discussed generally. There did not seem to be any hostility to the scheme, merely a desire to know how the cost was to be met.

Yours sincerely,

H. L. Bunyon

Proposed Thippagondanhalli Water Supply Scheme, Bangalore. Certain Proposed Heads of Agreement.

---

1. The Mysore Government in the Public Works Department does not wish to make a profit from the above supply.

2. The Mysore Government do not intend to make any difference between City and Station as to the rates to be charged each for water supplied.

3. As regards the Civil and Military Station the Mysore Government offers to supply filtered water delivered through a meter at High Ground Reservoir under the following conditions and at the following rates:-

(a) Payment shall be made for a minimum of 2 million gallons a day.

(b) Payment shall be made monthly.

(c) When the delivery at High Ground Reservoir for a calendar month averages the daily amounts given below payment shall be made for the total amount of water delivered during the month at the rates shown, except that a minimum of 2 million gallons a day shall always be paid for, vide (a) above, whether taken or not:-

| Average | | Rate |
|---|---|---|
| 2 million gallons a day or less | 7.50 annas | per thousand gallons. |
| 2 to 2¼ million gallons a day | 7.25 " | " " |
| 2¼ to 2½ " " " | 7.00 " | " " |
| 2½ to 3 " " " | } To be settled later | |
| 3 to 3½ " " " | | |

4. These rates to be current for five years from the date when the supply is taken into beneficial use. The rates subsequent to this to be considered and agreed upon based on the ascertained capital costs the usual rates of depreciation current in engineering practice and the actual working costs.

5. As it is undesirable to rely upon a single rising main indefinitely the Mysore Government agree to deposit any profit that may accrue from the working for the five years mentioned in Head 4 into a suspense account to be devoted to the construction of a second rising main.

6. The standard of purity of water to be determined by analysis of the water delivered at High Ground Reservoir and to be in accordance with that required by the Military.

7. The meter at High Ground Reservoir to be locked and accessible only to both parties together and to be read by both parties together.

THE MYSORE RESIDENCY,

40.

D.O.No. 7559

Bangalore 6th August, 1928.

Improvements to Bangalore Water Supply.

My dear Dewan Sahib

I am desired to inform you that the question of the new water supply scheme is regarded by the Government of India as a matter of extreme urgency. Until however the Resident is sure of the financial effect of the scheme so far as the Civil and Military Station of Bangalore is concerned, he cannot address them on the subject and he would therefore be grateful if you very kindly inform him, at your early convenience, what rates will be charged for filtered water to be supplied to the Civil & Military Station of Bangalore.

Vide S.N.2. Flag D.

Yours sincerely,

o/c

Mirza M. Ismail, Esquire, O.B.E., C.I.E.,
Dewan of Mysore.

B.

41

GOVERNMENT OF HIS HIGHNESS THE MAHARAJA OF MYSORE

General and Revenue Secretariat

Pol. No. 202/ Encls two

*Dated, Bangalore,* 16th August 1928.

*From*

N. MADHAVA RAO, Esq., B. A., B.
*Chief Secretary to the Government of His Highness the Maharaja of Mysore.*

RESIDENT'S OFFICE
BANGALORE
Register No. 8128
Date of Receipt 20/8/28
File No.

*To*

A. C. LOTHIAN, Esq., I.C.S.,
Secretary to the Hon'ble the Resident
in Mysore, BANGALORE.

Sir,

I am directed to acknowledge the receipt of your letter No. 7559 dated 10th August 1928, regarding the new Water Supply Scheme. After the informal conference in May last, the Chief Engineer, Mr. Bhore, had discussions with Mr. Russell and Col. Bingay regarding the rates for filtered and unfiltered water to be supplied from the New Reservoir. Mr. Russell has now been informed (copy of letter enclosed) that for a daily minimum supply of 2½ million gallons and above, the rate for unfiltered water will be 6.8 annas per 1000 gallons; and .7 anna for filteration making a total of 7.5 annas per 1000 gallons of filtered water delivered at the High Ground Reservoir; and for 2 million gallons and up to 2¼ million gallons 7 annas and .83 anna respectively making a total of 7.83 annas per 1000 gallons delivered at the High Ground Reservoir. The rates for filteration are tentative, as the detailed estimates are not yet prepared and necessary alteration can be made after the estimates are ready. These rates are not expected to vary much either way. It is expected that the proposed arrangement for filtering at the pumping station will be more economical than the present arrangement at the Combined Jewell Filter.

I am to request that you will be so good as to communicate

the

above to the Hon'ble the Resident in Mysore as the views of the Mysore Government, and I am to express the hope that the terms offered will be found to be satisfactory and an early decision reached in the matter.

I have the honour to be,

S i r,

Your most obedient Servant,

CHIEF SECRETARY TO GOVERNMENT.

41/a

D.O. letter No. 197/Enc.1 dated the 17th August 1928 from the Secretary to Government, Public Works Department, addressed to Mr. Russell.

*********

(1) I invite your kind reference to my D.O. letter No. 2 dated 3rd July 1928, forwarding a copy of the Proceedings of a meeting held at Carlton House on 2nd idem, re the rates for unfiltered water supplied to the Civil and Military Station from the New Reservoir. The question was further discussed by me with Col. Bingay, and it was suggested that rates for unfiltered as well as for filtered water may be given separately.

(2) The arrangement proposed originally was to supply filtered water from the Combined Jewell Filters, the capacity of the present plant being increased by additional filters, settling tanks, etc., It is now considered more economical and desirable from all points of view to install the filter plant at the pumping station itself and pump filtered water.

(3) I am desired by the Mysore Government to inform you that a rate of 6.8 annas per 1000 gallons will be charged for unfiltered water for a daily consumption of 2½ million gallons and above, and 7 annas per 1000 gallons for a daily consumption of 2 million gallons and up to 2½ million gallons.

(4) Rough estimates have been prepared for the installation of Patterson Filters at the Pumping Station, and as per enclose statement, the rate of filtration works out to .7 anna per 1000 gallons for a supply of 2½ million gallons, and .83 anna per 1000 gallons for a supply of 2 million gallons. These rates may be tentatively fixed subject to such alterations either way as may be necessary after detailed estimates are prepared for the filter plant.

(5) In accordance with the above, the rate for filtered water delivered at the High Ground Reservoir works out to 7.5 annas per 1000 gallons for a daily supply of 2½ million gallons, and

above and 7.83 annas for a daily supply of 2 million gallons and up to 2½ million gallons. It is presumed that the present Civil and Military Station main from the Combined Jewell Filters to the High Ground Reservoir will be available for pumping water.

(b) I am to request you to kindly communicate your early decision in the matter.

******

" C O P Y."

K. S. Rama Iyer
Superintendent, Chief Secretariat
Mysore Govt.

41/B

BANGALORE WATER SUPPLY.

THIPPAGONDANHALLI RESERVOIR PROJECT.

COST OF FILTRATION.

| | | |
|---|---|---|
| Buildings and Tanks. | ... | Rs. 2, 25,000/- |
| Filters etc. | ... | Rs. 3, 50,000/- |
| | Total | Rs. 5, 75,000/- |

1. 4 million gallons a day or 1460 million gallons a year.

| | | |
|---|---|---|
| Interest at 5½% on Rs. 5,75,000/- | | Rs. 31,626/- |
| Depreciation on filters at 5% on Rs. 3,50,000/- | | Rs. 19,250/- |
| Depreciation on buildings at 2% on 2,25,000/- | | Rs. 4,500/- |
| | Total | Rs. 55,375/- |
| Maintenance charges. | ... | Rs. 20,000/- |
| | Total | Rs. 75,375/- |
| Cost per 1,000 gallons. | .... | 0.83 annas. |

2. 5 million gallons a day or 1,825 million gallons a year.

| | | |
|---|---|---|
| Interest, Maintenance etc., as above. | | Rs. 55,375/- |
| Maintenance charges. | .... | Rs. 22,500/- |
| | Total. | Rs. 77,875/- |
| Cost per 1,000 gallons. | ... | 0.69 annas. |

*********

(Sd.) H.R. Venkatasubba Rao.
Executive Engineer,
Water Supply Division.

Bangalore,
dated 24-7-1928.

Very urgent

DEPARTMENT.

BRANCH.

File No. 1 & 2

Serial No.

**Draft** Letter / ~~Memorandum~~ / ~~Telegram~~ D. O.

Class for telegrams — Ordinary / Express / Urgent* / Priority / Clear Line† — *Only for Foreign Telegrams. †Not for Foreign Telegrams.

To be issued on | Issued on

1st Reminder.

2nd Reminder

3rd Reminder

Heading :

Case or Diary No.

If post copy of telegram required

Date of despatch of above

List of enclosures

(Code word for telegrams.)

No. 794/Eve 3. Dated 21/8/ 1928

From

To The Secretary to the Resident.

Lieut. Col. H. de Bingay, O.B.E., R.
C. R. E.,
Headquarters, Madras District

Improvements to Bangalore
Water Supply.

I am directed to invite a reference to ~~para 6 of~~ your D.O. letter, dated the 6th August, and to forward, for information a copy of letter No. G. 96-204, dated the 16th ~~18th~~ August, 1928, and of its enclosures, from the Chief Secretary to the Govt of Mysore. I am to enquire whether the rates proposed are acceptable to Military authorities.

E. Lobbett

Vide SN. 39

Vide SN. 41 (Col)

CRS. 20/8/928 1.8.28



MGIPC—FP—437DCF—S&P—(G-1478)—29-1-27—15,000 Pads.

Very urgent

DEPARTMENT. File No.

BRANCH. Serial No.

**Draft** Letter / Memorandum / Telegram

No. 7962 Ele Dated 24/8/ 1928

From The Secy to the Resident.

To

T. B. Russell, Esq, I.C.S.,
Resident, Mysore Comm.,
C.M. Station, Bangalore.

Improvements to Bangalore Water Supply.

I am desired to refer to the correspondence ending with your DO. letter, dated the 7th inst., and to forward a copy of letter No. Gol. 204, dated the 16th August, 1928, from the Chief Secy to the Govt of Mysore. I am to enquire whether the rates proposed are acceptable to the Mysore Comm. The favour of a very early reply is requested.

A. C. Lothian

Class for telegrams

| | |
|---|---|
| Ordinary | *Only for Foreign Telegrams. |
| Express | |
| Urgent* | |
| Priority | †Not for Foreign Telegrams. |
| Clear Line† | |

To be issued on | Issued on

1st Reminder

2nd Reminder

3rd Reminder

Heading :

Case or Diary No.

If post copy of telegram required

Date of despatch of above

List of enclosures

(Code word for telegrams.)

Y - SN. 37

O SN. 41
16. VIII

S. 5.

MGIPC—FP—437DCF—S&P—(G-1478)—29-1-27—15,000 Pads.

44.

8378
27/8/28

BANGALORE C & M STATION MUNICIPALITY

Office Hours :—
11 A.M. to 5 P.M.
Telephone No. 55.

Mayo Hall,
D.O.No.597/28 24 August 1928.

Dear Lothian

With reference to your letter No.7942 dated - August 1928, I understand from Bingay that the proposals now put forward by Mysore are not those on which he and Bore arrived at an agreement! There is therefore no use in laying them before the Municipal Commission at present. I am therefore deferring action until Bingay is in a position to agree to the Mysore rates.

Yours sincerely,

A. C. Lothian, Esq., I.C.S..
Secretary to the Resident
in Mysore,
Bangalore.

G/29/6
31

Headquarters, Madras Dist.
C.R.E's Office,
Bangalore, 28th Aug. 1928.

Dear Lothian,

SN. 42. In reply to your D.O.7941 of the 21st I enclose a note about these rates and also a suggested draft reply to the Mysore Government.

DELIVERY OFFICE
BANGALORE.
Registered No. 8268
Date of Receipt 30-8-28
Ref. No.

Please cut the draft about as you think fit of course. I may have used the wrong person, the wrong phraseology and poor English but I hope the meaning is clear.

Yours sincerely,

W. L. Bruce

The Secretary to the Hon'ble the Resident in Mysore.

Suggested Draft in reply to Mysore Government letter No.Pol.204, dated 16/13th August 1923.

---

I am directed to acknowledge the receipt of your letter No.Pol.204, dated the 16/10th August last regarding the new water supply scheme.

2. It is noted that it is now proposed to filter the water at the pumping station at the dam site and it is agreed that this is likely to prove a more economical arrangement.

3. I attach a copy of certain proposed heads of agreement regarding this water supply in which rates are included. Leaving the question of the rates themselves for the moment it is suggested that the Mysore Government should indicate their agreement to these heads as they define the various points which have been discussed and will enable me to have these definite points put before the Retrenchment Commission and eventually the Government of India. It is not suggested that these heads ~~state~~ cover all the matter to be included in the final agreements but merely that they define certain questions that have been dealt with in various conferences and talks.

4. Dealing now with the question of rates I think

attach a note by Lieut.-Colonel Bingay explaining how the rates suggested in Head 5 were derived. Subject to the receipt of a definite tender from the Lettersen Filter Company they appear to be fair to all parties.

3. I anticipate no difficulty in getting the consent of the Government of India to handing over the present G.I.P. Station main between Hebbal and High Ground Reservoir to the Mysore Government.

4. Would you kindly take the above into consideration and let me have a reply in order that the matter may be put before the G.I.P. Station Commission and the Government of India for consideration.

Enclosures.
Heads of Agreement.
Note by Lt.-Col. Bingay.

Proposed Thippagondanhalli Water Supply Scheme, Bangalore. Certain Proposed Heads of Agreement.

---

1. The Mysore Government in the Public Works Department does not wish to make a profit from the above supply.

2. The Mysore Government do not intend to make any difference between City and Station as to the rates to be charged for water supplied.

3. As regards the Civil and Military Station the Mysore Government offers to supply filtered water delivered through a meter at High Ground Reservoir under the following conditions and at the following rates:-

(a) Payment shall be made for a minimum of 2 million gallons a day.

(b) Payment shall be made monthly.

(c) When the delivery at High Ground Reservoir for a calendar month averages the daily amounts given below payment shall be made for the total amount of water delivered during the month at the rates shown, except that a minimum of 2 million gallons a day shall always be paid for, vide (a) above whether taken or not:-

| Average. | Rate. |
|---|---|
| 2 million gallons a day or less | 7.50 annas per thousand gallons. |
| 2 to 2½ million gallons a day | 7.25 " " " |
| 2½ to 2½ " " " | 7.00 " " " |
| 2½ to 3 " " " | To be settled later |
| 3 to 3½ " " " | |

4. These rates to be current for five years from the date when the supply is taken into beneficial use. The rates subsequent to this to be considered and agreed upon based on the ascertained capital costs, the usual rates of depreciation current in engineering practice and the actual working costs.

5. As it is undesirable to rely upon a single rising main indefinitely the Mysore Government agree to deposit any profit that may accrue from the working for the five years mentioned in Head 4 into a suspense account to be devoted to the construction of a second rising main.

6. The standard of purity of water to be determined by analysis of the water delivered at High Ground Reservoir and to be in accordance with that required by the Military.

7. The meter at High Ground Reservoir to be locked and accessible only to both parties together and to be read by both parties together.

Note on Rates proposed in the Mysore Governments letter No.Pol,204 dated 16/18th August 1928.

---

1. These proposed rates are for convenience restated below:- (in annas per thousand gallons)

| Million Gals.per day | Unfiltered | | Filtration | | Filtered. |
|---|---|---|---|---|---|
| 2 to 2½ | 7.0 | + | .83 | = | 7.83 |
| 2½ and above | 6.8 | + | .70 | = | 7.50 |

2. These unfiltered rates do not agree with those calculated for the latest Mysore Proposal i.e. for a 27" pipe line, 7 miles of steel and 10 miles of cast iron pipe. The rates calculated by the Mysore Engineers for this proposal are:-

| Million gallns per day | Unfiltered. |
|---|---|
| 2 | 7.00 |
| 2½ | 6.21 |

3. The Mysore estimate of cost of filtration forwarded with the above quoted letter is admittedly a rough one. In my opinion far too much has been allowed for depreciation on the filters and also I think it will be found that the capital cost will not be so great as that estimated. My estimate of the cost of filtration is:-

| Million gallons per day | Filtration. |
|---|---|
| 2 | .61 |
| 2½ | .51 |

This will be capable of check when the tender from the Patterson Filter Company is received.

4. Taking these rates with those in para 2 the cost becomes:-

| Million Gallons per day | Unfiltered | | Filtration | | Filtered. |
|---|---|---|---|---|---|
| 2 | 7.0 | + | .61 | = | 7.61 |
| 2½ | 6.21 | + | .51 | = | 6.72 |

5. These rates were put down in round figures as:-

| Million gallons per day | Filtered. |
|---|---|
| 2 | 7.5 |
| 2½ | 7.0 |

6. It was felt that perhaps the gap between 2 and 2½ was too wide and a rate was interpolated giving those in Head 3.-

| Million gallons per day. | Filtered. |
|---|---|
| 2 | 7.5 |
| 2 to 2¼ | 7.25 |
| 2¼ to 2½ | 7.00 |

7. It is not possible to arrive at exact rates until capital costs are known after the completion of the work and working costs are known over a period of actual use and it is suggested that the rates in para 6 are a fair balance between possible over estimating and under estimating.

8. If the costs have been underestimated Head 4 provides for a reconsideration of rates in 5 years time. If the costs have been over estimated Head 5 provides a method of dealing with the profit made in these 5 years which is fair to all parties.

H. L. Briggs

Lt.Col.R.E.,

C. R. E. Madras Dist.

All communications should be addressed to the Secretary to the Resident in Mysore, Bangalore, by designation and not by name.

U R G E N T.

No. 8240 413-1928 ENC. 2

46

FROM

A. C. Lothian, Esquire, I.C.S.

SECRETARY TO THE RESIDENT IN MYSORE.

To

The Chief Secretary to the Government of

His Highness the Maharaja of Mysore.

*Dated Bangalore,* 4 Sept. 1928.

**Subject.**

Improvements to Bangalore Water Supply.

SIR,

I am directed to acknowledge the receipt of your letter No. 204, dated the 18th August, 1928, regarding the new Water Supply Scheme.

S.N.41

2. It is observed that it is now proposed to filter the water at the Pumping station at the dam site and the Resident agrees that this is likely to prove a more economical arrangement.

3. I attach a copy of certain proposed heads of agreement regarding this water supply, in which rates are included. Apart from the question of rates, it would be helpful if the Mysore Government would indicate their agreement to these heads, as, although not exhaustive, they nevertheless sum up those conclusions on which as a result of the various discussions it is believed there is practical unanimity between the parties. The matter could then be laid before the Station Municipal Commission and eventually the Government of India.

4. As regards the question of rates, I append a note by Lieutenant Colonel Bingay explaining how the rates suggested in Head 3 were arrived at. Subject to

the receipt of a definite tender from the Patterson Filter Company, they appear to be fair to all parties.

5. No difficulty is anticipated in getting the consent of the Government of India to handing over the present Civil and Military Station main between Hebbal and High Ground Reservoir to the Mysore Government.

6. The Resident would be glad if the Government of Mysore would favour me with a very early reply.

I have the honour to be,

Sir,

Your most obedient servant,

(with [illegible]). A.C. Lothian

SECRETARY TO THE RESIDENT.

BJ

C.R.S. 31/8/28

150/31/8